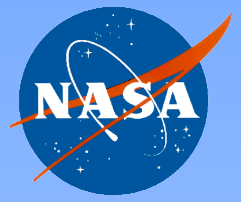

AIRS Level-2 Algorithm Architectural Observations

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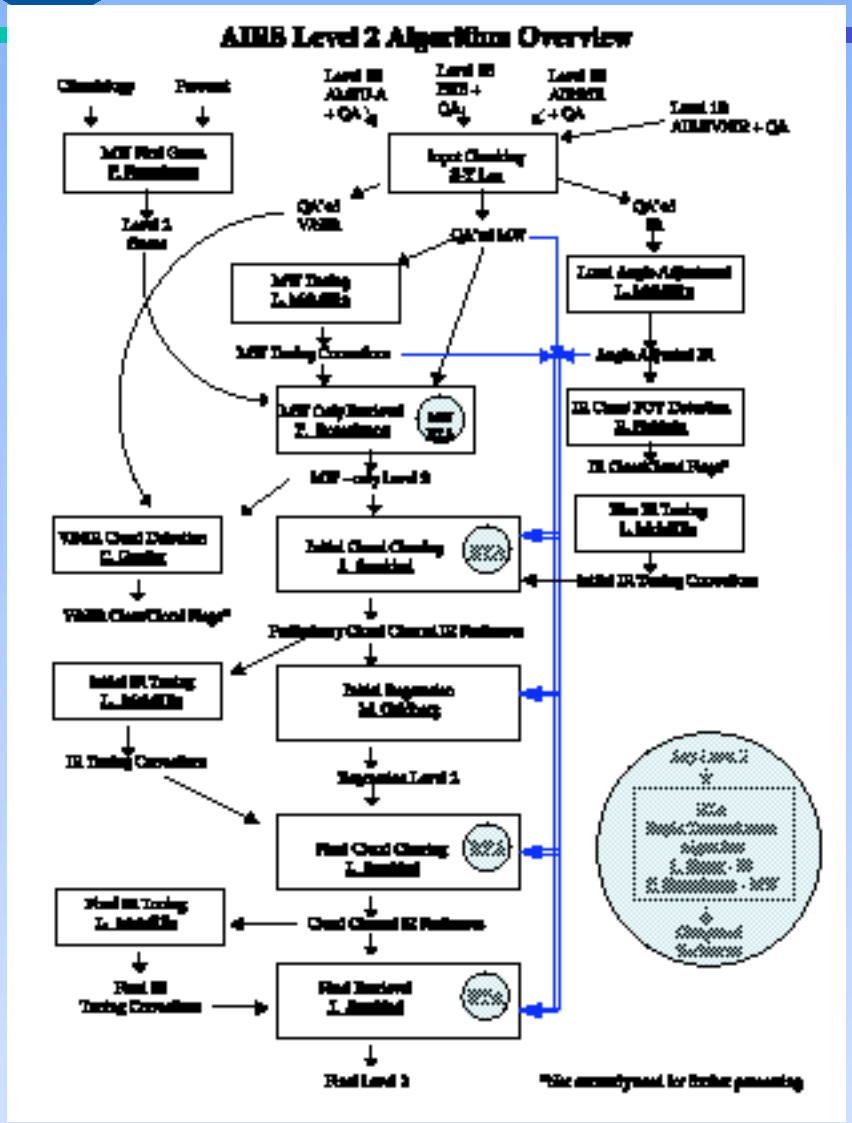
AIRS Level 2 Algorithm Overview



- Top Level
- Excludes Precipitation
- Excludes Output QA

Repeatable Steps

- **Some retrieval steps are repeated**
  - IR tuning
  - Cloud Clearing
- **But other light-weight retrieval steps are not repeated**
  - MW-only retrieval
  - V/NIR cloud flagging
  - Regression retrieval

Underexploited Products

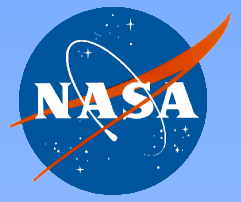
- **These quantities are calculated early but not exploited later:**
  - Precipitation (flag, rain rate, corrections)
  - V/NIR and IR cloud flagging
- **Suggested uses:**
  - QC on input – don't attempt retrieval where there is too much cloud cover or precipitation
  - QC on outputs – flag as bad retrievals which are inconsistent with precipitation or cloud estimates
  - Ultimate goal is to use these quantities inside the retrieval, but this must wait until they are validated

Other Underexploited Data

- **Information available for retrieval but not used:**
  - Channels not used in physical retrieval
  - Surface emissivity guess information
    - AIRS multiday V/NIR vegetation map
    - Other static or dynamic data sets
  - Data from neighboring profiles
    - Gradients can be used as QC
    - More than 3x3 IR for cloud clearing
    - 2-pass retrieval with median of neighboring values used as input guess to second pass, especially for smoothly-varying quantities
      - CO2
      - Stratospheric ozone

Instability in Level 2

- **Minor input changes cause major changes in some profiles**
  - Compiler/platform
  - Minor changes in surface pressure
- **Mostly in profiles that change retrieval type**
- **More research is needed**



Propagation of Bad Values

- Bad values from one retrieval step will spill over
- Each retrieval step should check its inputs and outputs against some measure of reasonability
- Regressions are particularly vulnerable to inputs outside of their training regime
- I'm working with Phil Rosenkranz to implement such checks for the MW RTA first

Optimization

- **Improving Level-2 performance would help:**
  - NOAA Near-Real-Time timeliness
  - Direct Broadcast
  - Speed up reprocessing campaigns at Goddard DAAC
  - Compensate for time-consuming algorithm enhancements
    - CO_2
- **Approaches:**
  - Superchannels (needs RTA support)
  - Remove some cloud-clearing iterations (Chris Barnet)
  - Low-level coding optimizations